

# PATENT SPECIFICATION

605,903



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## PROVISIONAL SPECIFICATION

### Improvements in or relating to Space Heaters

We, THE JOHN COMPTON ORGAN COMPANY LIMITED, a British Company, of Minerva Road, Willesden, London, N.W.10, and REUBEN FREDERICK EAGLE, a British Subject, of 11, Derwent Avenue, Hatch End, in the County of Middlesex, do hereby declare the nature of this invention to be as follows:—

This invention relates to space or room heaters. The object of the invention is the provision of an improved space or room heater, and the nature of the invention will be understood from the following description of one embodiment thereof.

In accordance with this embodiment the heater comprises a number of electrical heater units located within an outer casing through which air is capable of circulating freely from the bottom to or near the top.

The heater units each consist of two elongated plates of insulating heat resisting material (say mica) spaced apart from each other in parallel relation, and a length of suitable resistance wire wound round said insulating plates. Each plate is formed with slots extending at right angles into its longitudinal edges and each turn of the wire passes round both plates and is located in the edge slots of said plates. The slots in the two edges of each plate are in staggered relation to each other.

The wire employed is as far as practicable straight, but it is found that, in order that it shall retain its form, it must be slightly spiralled, i.e. it must be made as a spiral of relatively very small diameter and large pitch. This wire may be wound as a single spiral extending turn by turn from one end of the insulating plates to the other. Alternatively it may be wound non inductively, forming two spirals in series extending in opposite directions and each having its turns interleaved by those of the other.

A feature of the invention is that the tension of the wire itself serves to hold the insulating plates in assembled relation. The said plates are spaced apart by spacing rods whose ends pass through holes in said

plates near the ends thereof, and which have circlips sprung into grooves near their ends for abutting against the inner surfaces of the plates and maintaining them apart. When the plates and spacing rods are assembled in this way, the wire is wound on the plates and thus serves to hold the said plates in abutment against the circlips. The wire may be the sole means for holding the plates in assembled relation in this way.

Instead of the circlips, it would be possible to use a spacing sleeve slid on each spacing rod, said spacing sleeve being nearly as long as the spacing rod and adapted to have its ends abutting against the inner surfaces of the insulating plates in place of the circlips.

A number of the heater units are supported in the casing in a generally upright orientation (i.e. with the insulating plates upright). The supporting means for each unit consist of a number of tension springs with small insulating links inserted as a further safety measure connected respectively to the four corners of the unit and extending to fixed points of the structure within the casing. For connecting the tension springs to the four corners of the unit, each of said tension springs may have an end hooked through a small diametrical hole in the projecting end of the spacing rod at that corner of the unit. The tension springs will lie in the general plane of the unit, the upper pair diverging upwardly and outwardly, and the lower pair downwardly and outwardly.

The heater units may be strictly vertical and parallel to each other, or they may be parallel to each other and somewhat inclined to the vertical, or they may be splayed, a centre one being vertical and two outside ones being inclined downwardly and outwardly. The arrangement is such that there is always at least a quarter of an inch space between wires, whether between turns of the same unit or between the nearest parts of turns of adjacent units.

The arrangement is such that the temperature of the wires is of the order of 800°F.

[Signature]

In one simple structural arrangement, we employ three upright heating units as heretofore described, and these are encased in a casing which has a perforated bottom and a perforated top and whose front and back (alongside the two outer units) are constituted by respective perforated plates or grills.

The front, back and top of this casing are constituted by a single sheet of metal bent to the form of an inverted channel, the sides of which diverge somewhat so that the casing is deeper at the bottom than at the top. The two end walls are each constituted by a plate of sheet metal of the required shape with its edges bent over at right angles so as to form flanges, the flanges engaging outside the end edges of the inverted channel and the parts being secured by means of rivets passing through said flange.

The length of the inverted channel may be of the order of sixteen inches, and the flanges on the end walls are made deep so as to add a further say six inches to the total length of the casing.

The perforated bottom is added in any suitable way and is of course raised above the ground.

In accordance with a somewhat different structural arrangement, the casing is assembled on, and supported by, four circular upright rods at the four corners of the structure. At the bottom these four upright rods pass through holes in a bottom base or plinth. This bottom base or plinth is a frame-like casting, stamping or pressing with a skirt depending downwardly from its outer edge. The upright rods pass down to a level just below that of the bottom edge of the skirt, and at its bottom extremity each rod makes screwed engagement within a screwed portion of a bottom spacing tube whose upper end abuts against the under surface of the frame portion of the base or plinth. The lower extremity of each bottom spacing tube, which extends just below the lower extremity of the upright rod, carries a foot of inverted dome form, and thus the plinth is supported just a little above the ground on the four feet.

Each of the spacing tubes is divided near its upper end into two parts and between the lower parts of said spacing tubes on the one hand and the upper parts on the other is clamped a perforated horizontal plate, which is threaded at its corners on to the four upright rods.

The portions of the four upright rods extending upwardly from the base or plinth are surrounded by further spacing tubes, hereinafter termed the main spacing tubes. These extend upwards to the top of the casing and a perforated top plate is threaded on to the four upright rods and rests on the top ends of said main spacing tubes. These

main spacing tubes are of much greater cross section than the upright rods and are correctly centred with respect to said rods by washers threaded on said rods and resting on the top of the base or plinth and fitting within said main spacing tubes.

The portions of the four upright rods extending upwardly from the perforated top plate are surrounded by further spacing tubes, hereinafter termed the top spacing tubes. At their upper extremities said upright rods terminate in enlarged heads and said rods are screwed into the bottom spacing tubes until said heads clamp down on the top of the top spacing tubes, and it will be understood that, simultaneously the perforated bottom plate, the base or plinth and the perforated top plate will all be clamped in place.

The top spacing tubes are also of much greater cross section than the upright rods, and they are centred by annular shoulders on the under side of the said enlarged heads.

The space between the perforated top and the base or plinth is the space which contains the heater elements, and this space is enclosed by means of a single perforated or grilled wrapper plate which is wrapped round the four main spacing tubes.

The top spacing tubes are joined in pairs at their upper ends by transverse hollow rods whose ends enter holes in the sides of said top spacing tubes. These transverse hollow rods form the handles for carrying the device. They are made of a non metallic material which is a good heat insulator, and so also are the top spacing tubes.

In the present arrangement the outer ends of the tension springs which support the heater elements may be anchored to horizontal rods or tubes—two at the top and two at the bottom—which extend between the main spacing tubes.

In either of the above embodiments, the insulating plates on which the wires are wound may be of other material than mica. When they are of mica they can be simple flat plates, but when they are of other insulating material (usually of much less strength) they may need to be formed with a central strengthening rib along their outer surfaces. This rib—which will be slotted for reception of the wire—will also have the advantage that the wire will be spaced from most of the surface of the plates.

Dated this 4th day of January, 1946.

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For the Applicants.

## COMPLETE SPECIFICATION

## Improvements in or relating to Space Heaters

We, THE JOHN COMPTON ORGAN COMPANY LIMITED, a British Company, of Minerva Road, Willesden, London, N.W.10, and REUBEN FREDERICK EAGLE, a British Subject, of 11, Derwent Avenue, Hatch End, in the County of Middlesex, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to space or room heaters. The object of the invention is the provision of an improved space or room heater and the invention comprises a casing having back and front walls, and a heater unit mounted in said casing, said heater unit comprising a pair of substantially straight spaced supporting elements with lengths of heating wire extending between them so as to form a heating area facing, and freely exposed to, said back and front walls, said back and front walls being perforated so that air may freely flow through them.

The invention further comprises a casing having back and front walls, and a heater unit mounted in said casing, said heater unit comprising a pair of spaced supporting elements with a plurality of continuous heating wires each extending back and forth between said supporting elements and thereby each constituting a number of lengths of heating wire, whereby a heating area is formed facing and freely exposed to said back and front walls, said back and front walls being perforated so that air may freely flow through them.

In order that the invention may be the more clearly understood, two space or room heaters in accordance therewith will now be described, reference being made to the accompanying drawings, wherein:—

Figure 1 is a perspective view of one of said heaters;

Figure 2 is a sectional front elevation of the same;

Figure 3 is a sectional side elevation of the same on line III—III of Figure 2;

Figure 4 is a perspective view of the other heater;

Figure 5 is a sectional front elevation of the same;

Figure 6 is a sectional side elevation of the same on line VI—VI of Figure 5;

Figure 7 is a view to a larger scale illustrating certain constructional features of the same;

Figure 8 is a view of a detail which is common to both heaters.

Referring first to Figures 1 to 3 the heater therein illustrated comprises an electrical heater unit 1 located within an outer casing 2

through which air is capable of circulating freely from the bottom to or near the top.

Said heater unit 1 consists of two elements in the form of elongated plates 3 of insulating heat resisting material spaced apart from each other in parallel relation, and a number of (in the present instance, three) lengths 4a, 4b and 4c of suitable resistance wire each extending to and fro between said insulating plates 3. Each plate 3 is formed with six parallel rows of holes through it, as shown in Figure 3, said rows extending longitudinally of the plate and the holes of the two plates being respectively opposite to each other. The lengths 4a, 4b and 4c of wire pass to and fro by being threaded through the holes of the two plates 3. Each length passes from one end hole of a row to the opposite one and then back through the adjacent hole of the same longitudinal row and so on, until the two opposite rows of holes are occupied. Then said length of wire returns by way of the next two opposite rows

of holes. Thus each length of wire occupies two rows of holes in each of the insulating plates 3. The arrangement is such that the terminals of all three of the lengths of wire are located at the same end of the same insulating plate. The holes of adjacent rows are staggered with respect to each other as shown and thus the transverse heating portions of wire extending between the insulating plates are as far apart from each other as possible.

The said transverse heating portions of wire are spiral or helical in form as shown in Figure 2, whereas the short portions extending from one hole to the adjacent one along the remote surfaces of the insulating plates 3 are more or less straight.

For securing the insulating plates in parallel spaced relation as described, two metal rods 5 at each end may be employed.

The heater unit 1 is supported in the casing in an upright orientation as shown (i.e., with the insulating plates 3 upright). The supporting means for the unit consist of eight tension-spring links 6 extending from the eight corners of the two insulating plates 3 to lugs 7 or other suitable attachment means on the inside of the walls of the casing 2. Thus the unit 1 is resiliently supported.

The said tension-spring links extend in an outward direction from all three centre planes of the unit 1. Each of said links as clearly shown consists of a wire hook which hooks in a hole at the appropriate corner of the insulating plate 3 and is attached at its other end to one end of a short helical tension-spring whose other end is secured to fixed lug 7.

In order that the transverse heating portions of the wires 4a, 4b and 4c shall be maintained in tension and shall thereby be prevented from sagging, the bolts 5 are rigidly connected to one only of the plates 3, viz., the one on the left of Figure 2 and on the right of Figure 8.

The other plate 3 is capable of sliding longitudinally on the rods 5, and thus the force exercised by the tension-spring links 6 and tending to pull the plates 3 apart is balanced by the force exercised by the transverse heating portions of the wires 4a, 4b and 4c tending to draw the plates 3 together. Thus, as stated, the said transverse heating portions are maintained in tension. As shown, nuts 8 are provided on the rods 5 for limiting the sliding movement of the movable plate relative to said rods.

The casing 2 in which the unit 1 is encased has a perforated bottom 9 and its front and back (parallel to the heating portions of the wires) are also perforated. Thus the front, back and top of this casing may be constituted by a single sheet of metal 10 bent to the form of an inverted U or channel, the sides of which diverge somewhat so that the casing is deeper at the bottom than at the top. The two end walls 11 are each made of the required shape with their edges bent over at right angles so as to form flanges 11a, the flanges engaging inside the inverted channel 10, as best seen in Figure 2, and the parts being secured by means of rivets passing through said flanges.

The perforated bottom 9 is secured in any suitable way and is, of course, raised above the ground.

The inverted U or channel 10 may be made in two parts one of which may be removable to give access to the interior of the casing.

In the particular arrangement illustrated, the terminals of the wires 4a, 4b and 4c are at the top of the unit 1 and are connected by leads 12 to a selector switch 13 which determines how many and which of said wires is or are energised. Said switch 13 is mounted on the inside of one of the end walls 11 and is actuated by means of a hand knob 14 on the outside of said wall. The reference 15 designates an indicator lamp which is energised whenever the device is connected to the source of supply, whether any part of the heater unit is energised or not.

Referring now to Figures 4 to 7, the heater illustrated in these Figures differs from that just described only in respect of the outer casing 16. The parts within said casing 16 are the same as those of the preceding heater and are designated by the same references.

Said casing 16 is assembled on, and supported by, four circular upright rods 17 (Figure 7) at the four corners of the structure. At the bottom, these four upright rods pass

through holes in a bottom base or plinth. This bottom base or plinth takes the form of a perforated plate 18 with a skirt 18a depending downwardly from its outer edge. The upright rods 17 pass down to about the same level as that of the bottom edge of the skirt, and, at its bottom extremity, each rod 17 makes screwed engagement with a nut 19. Threaded on each rod 17 above the respective nut 19 is a washer 20 and a bottom spacing tube 21, the washer abutting against the nut and the spacing tube between said washer and the plate 18.

The portions of the four upright rods 17 extending upwardly from the base or plinth are surrounded by further spacing tubes 22, hereinafter termed the main spacing tubes. These extend upwards to the top of the casing and a perforated top plate 23 is threaded on the four upright rods 17 and rests on the top ends of said main spacing tubes 22. These main spacing tubes 22 are correctly centred with respect to said rods by having their upper and lower ends turned inwardly as shown, or by having centreing washers mounted at their upper ends.

The portions of the four upright rods 17 extending upwardly from the perforated top plate 23 are surrounded by further spacing tubes 24, hereinafter termed the top spacing tubes. At their upper extremities, said upright rods 17 make screwed engagement or are otherwise secured to, enlarged heads 25 which form closures for the upper ends of the top spacing tubes 22 as shown, and the nuts 19 are screwed up until the top plate 23 is clamped between the spacing tubes 24 and 22 and the bottom plate 18 is clamped between the spacing tubes 22 and 21. The tapped holes of the nuts 19 do not pass completely through them and the lower surfaces of said nuts are, therefore, beneath the lower edge of the skirt 18a. The lower surfaces of said nuts 19 are domed as shown and thus the plinth is supported a little above the ground on the four domes.

As shown all the spacing tubes are of much larger cross section than the rods 17.

The space between the perforated top plate 23 and the perforated bottom plate 18 is the space which contains the heater unit 1 and this space is enclosed by means of a single perforated or grilled wrapper plate 27 which is wrapped round the four main spacing tubes 22, thereby completing the casing.

The tension spring links 6, instead of being connected as in the preceding embodiment with lugs 7 mounted on the inside of the casing, are connected to horizontal rods 26 which bridge the adjacent main spacing tubes 22 at their upper and lower ends as shown.

The top spacing tubes are joined in adjacent pairs at their upper ends by transverse rods

28 whose ends enter holes in the sides of said top spacing tubes. These transverse rods form the handles for carrying the device. They are made of a non-metallic material which is a good heat insulator.

In the case of both of the above constructions, the switch 13 has an off position and five different on positions for giving five different degrees of heating. This switch is mounted on the inside of the casing close to the terminals of the three lengths of wire. The five on positions of the switch give the following connections:—

- (1) All three wires in series;
- (2) Two wires in series;
- (3) One wire only in circuit;
- (4) Two wires in parallel;
- (5) All three wires in parallel.

It is intended that the wires shall never reach red heat, the maximum temperature being about 800°F.

Other details are deemed sufficiently clear from the drawings.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A space or room heater comprising a casing having back and front walls, and a heater unit mounted in said casing, said heater unit comprising a pair of substantially straight spaced supporting elements with lengths of heating wire extending between them so as to form a heating area facing, and freely exposed to said back and front walls, said back and front walls being perforated so that air may freely flow through them.

2. A heater according to claim 1, wherein said heater unit comprises a continuous wire extending back and forth between said supporting elements thereby constituting a number of lengths of heating wire.

3. A heater according to claim 2, wherein there are a plurality of such continuous wires extending back and forth between said supporting elements.

4. A space or room heater comprising a casing having back and front walls, and a heater unit mounted in said casing, said heater unit comprising a pair of spaced supporting elements with a plurality of continuous heating wires each extending back and forth between said supporting elements and thereby each constituting a number of lengths of heating wire, whereby a heating area is formed facing and freely exposed to said back and front walls, said back and front walls being perforated so that air may freely flow through them.

5. A heater according to claim 3 or 4, and comprising switching means whereby the number of said heating wires (or tappings thereof) which are connected in circuit and

their relation, whether series or parallel, may be selected.

6. A heater according to claim 3, 4 or 5, wherein each of said continuous wires extends back and forth over substantially the whole effective length of said supporting elements.

7. A heater according to claim 6, wherein the terminals (or tappings) of each continuous wire are at the same end of one of said supporting elements.

8. A heater according to any of claims 2 to 7, wherein said supporting elements are of insulating material and said (or each) continuous heating wire is threaded through holes in said supporting elements.

9. A heater according to any of the preceding claims, wherein the lengths of heating wire are helical.

10. A heater according to any of the preceding claims, wherein the mounting of said heater unit in the casing is a resilient mounting.

11. A heater according to claim 10, wherein said mounting consists of a plurality of tension-spring links extending from said unit to the casing, so that said heater unit is suspended resiliently by said links.

12. A heater according to claim 11 and in which said supporting elements are mounted so as to be capable of varying their distance apart wherein said tension-spring links are attached to said supporting elements and constitute means for biasing said supporting elements apart, so that the lengths of heating wire are maintained permanently in tension and do not sag when heated.

13. A heater according to any of the preceding claims, wherein the front, back and top of said casing are constituted by a single sheet of metal bent to the form of an inverted U or channel and closed by two end plates and a bottom plate.

14. A heater according to claim 13, wherein the sides of the inverted U (i.e., the back and front of the casing) diverge so that the casing is deeper at the bottom than at the top.

15. A heater according to any of the claims 1 to 12, wherein said casing is assembled on and supported by, four upright rods, and the top and bottom of the casing are located by spacing tubes on said rods.

16. A heater according to claim 15, wherein the front, back and sides of said casing are constituted by a wrapper plate wrapped round the rod structure between the top and bottom of the casing.

17. A heater according to claim 15 or 16, wherein the rod structure extends up above the top plate and cross members are provided supported at the upper end of the rod structure to constitute handles.

18. A space or room heater substantially as herein described with reference to the accompanying drawings.

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Dated this 2nd day of January, 1947.

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For the Applicants:

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605,903 COMPLETE SPECIFICATION

3 SHEETS  
SHEET 1

FIG. 1.

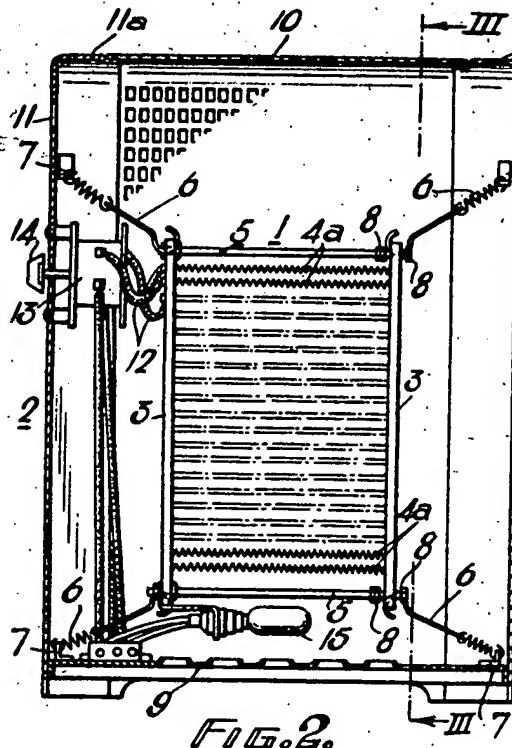
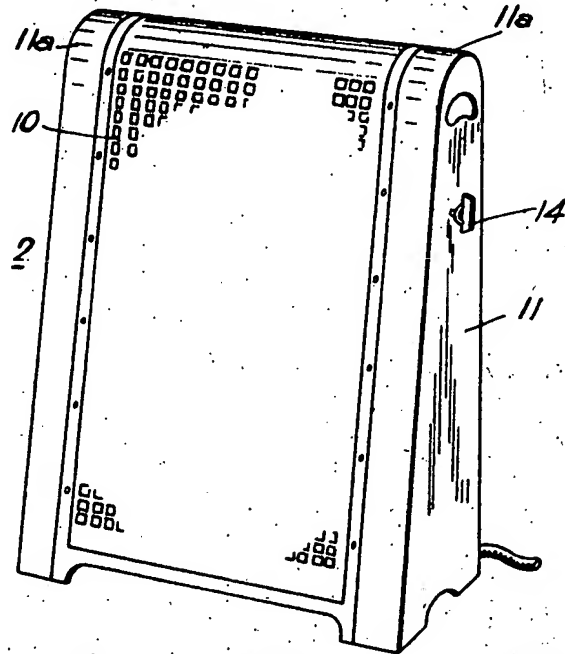


FIG. 2.

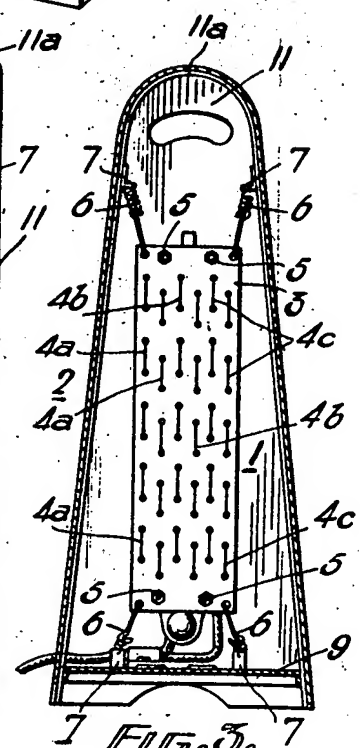
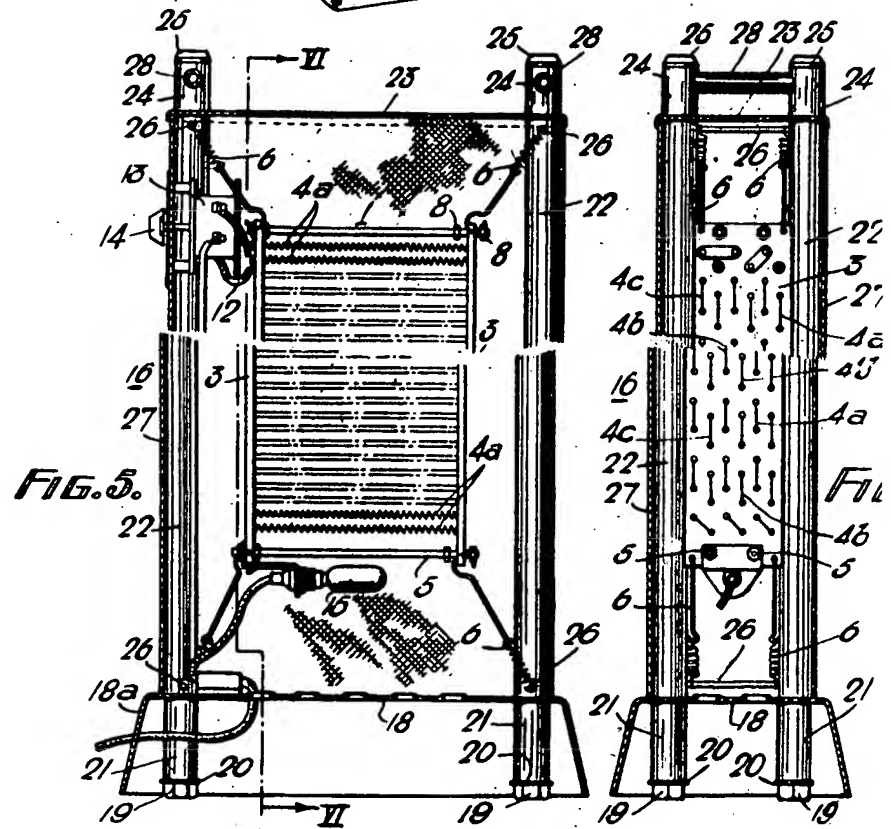
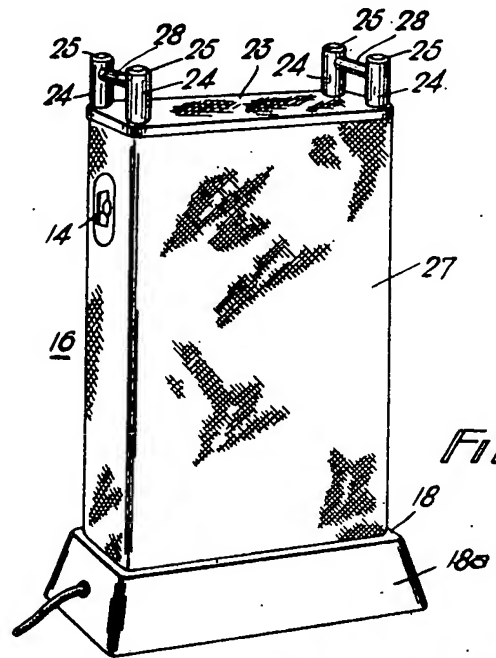


FIG. 3.

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[This Drawing is a reproduction of the Original on a reduced scale.]





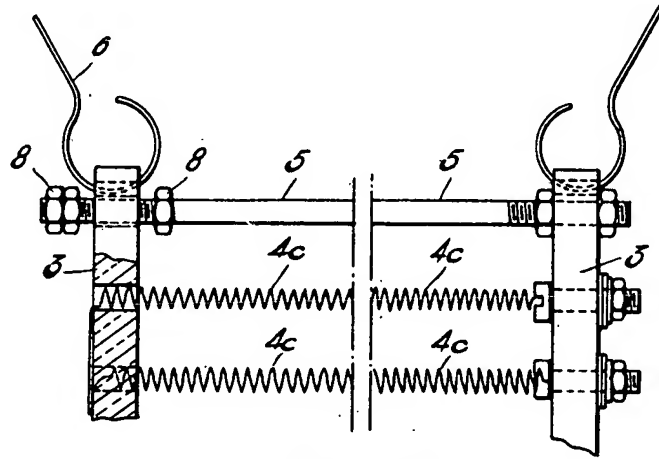


FIG. 8.

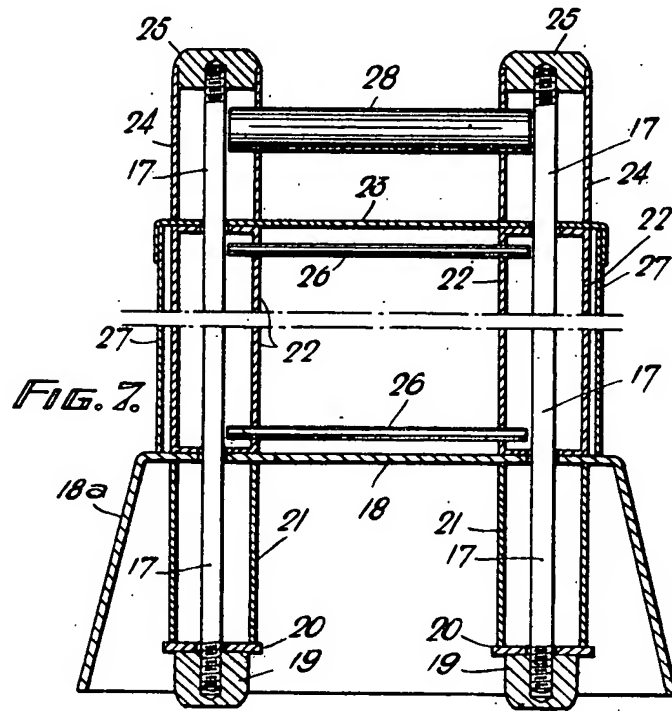


FIG. 7.

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